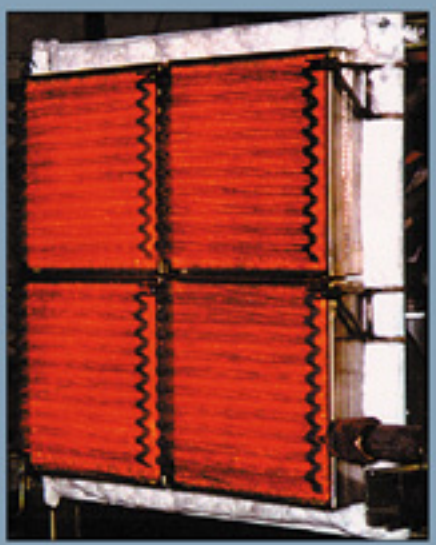
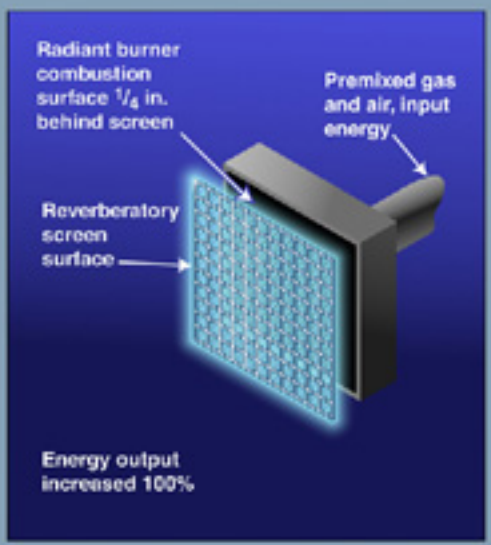
Chemical Vapor Infiltration (CVI) is Being Used to Fabricate Ceramic Composite Radiant Burner Screens

Honeywell Advanced Composites is utilizing chemical vapor infiltration to densify fiber performs with silicon carbide and produce rigid components.





Applications

Radiant burners are used in a wide range of applications in industrial, commercial and residential markets. Applications include warm air furnaces, water heaters, metal treating, glass forming, volatile organic chemical thermal oxidizers, fire and water-tube boilers, plastic, paper and paint drying, and process heaters. Increased radiant output is most significant in markets where direct radiative infrared heating is employed to heat, process, or dry a load. Examples of such applications are drying and curing paints, epoxies and other coatings, paper, and textiles.

Research performed at

Honeywell
Advanced Composites Inc.

ornl
OAK RIDGE NATIONAL LABORATORY

UT-BATTELLE

Benefits

The advantages of CFCC materials combined with the low emissions capabilities of radiant burners will:

- *increase radiant heat output by 50% and reduce fuel consumption by 33%*
- *provide industry a cost-effective means to meet Clean Air Act requirements*
- *result in economic benefits due to longer life, increased thermal efficiency, and lower maintenance*

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CFCC Radiant Burner Screens

Honeywell Advanced Composites and the Alzeta Corporation have been working together on a CVI matrix CFCC screen to be placed as a reverberatory surface above Alzeta's burners. The concept of employing a screen adjacent to a radiant burner has been known for some time. However, attempts to use high alloy steel screens for this application have met with failure due to severe corrosion and embrittlement of the metal screen. The latest CFCC screen design provides enhanced structural resistance to physical impact damage and increased radiant surface area. The screen application saves energy and significantly reduces both NOx and CO_2 emissions accompanying the more efficient use of natural gas.

Significant progress has been made in the development of efficient burner screens.

- Thermal fatigue testing of 10,000 thermal cycles to temperature and 15,000 on-off cycles has been conducted with no damage to the CFCC screens.
- Tests of 1,000 hours at temperature have been performed and were terminated since no change in the properties of the screens was noted.
- Glass processing and paper printing drying plant simulation tests were conducted using radiant burners and screens. The two small-scale plant tests were considered successful. New industrial applications are being evaluated.
- Tests with an automotive glass manufacturer demonstrated higher throughput from existing footprint furnaces with faster processing times, greater adjustability of the furnace, and lower energy costs compared to incumbent electric radiant heaters.
- Cost reduction activities for Honeywell Advanced Composites' enhanced SiC/SiC screens have been active and successful. Adoption of resin derived interface coatings have resulted in scale-up quantities of screens at costs that are a quarter of previous screens.
- Honeywell Advanced Composites is developing burner applications with other burner companies. They are evaluating tubular and flat CFCC screen configurations for various applications.

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